

REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

I. Status of the Claims

Claim 1 is amended to recite “movements of the tubular organ structures”. Support for this amendment can be found throughout the specification, in particular on page 3 in the third paragraph, on page 4 in the first paragraph, and on page 5 in the sixth and eighth paragraphs.

It is acknowledged that the foregoing amendments are submitted after final rejection of the claims. However, because the amendments do not introduce new matter, and either place the application in condition for allowance or at least in better condition for appeal, entry thereof by the Examiner is respectfully requested. Claims 17-22 are withdrawn. Upon entry, claims 1-16 and 23-30 will be pending for examination.

II. Rejections under 35 U.S.C. §102(e)

The Examiner maintains the rejection of claims 1-15 and 23 -30 under 35 U.S.C. §102(e) as allegedly being anticipated by US Patent No. 7,844,320 (“Shahidi”). Office Action at page 4. Applicants respectfully traverse this ground of rejection.

To anticipate a claimed invention, a reference must teach each and every element of the claims. As detailed below, Shahidi fails to meet this requirement.

- A. Shahidi does not teach correcting the instrument position by a transformation *defined by an optimization method*, as required by the claimed invention.**

The Examiner asserts that Shahidi teaches transformation defined by an optimization method because “Shahidi teaches tracking or monitoring or taking into account information on the previous distance covered by the incision device through tissue by displaying the data set

where the surgeon can monitor every step of the incision as he or she moves through the tissue.” Office Action, page 3, item 3. Applicants respectfully disagree.

Contrary to the Examiner’s assertion, Shahidi does not teach transformation defined by an optimization method. This is because the transformation of Shahidi only involves a one-to-one mapping of the instrument coordinates and orientation into a perspective view onto a cutting plane of the volumetric data. In this regard, Shahidi discloses “an optical tracking system (OTS) ... mounted on the surgical instrument” to generate position detecting data to track the position and orientation of the surgical instrument. *See Shahidi, column 5, line 51-54.* “With this information, the three-dimensional scan data is then manipulated to position and orient the resulting three-dimensional perspective view and to define cutting planes.” *See Shahidi, column 7, line 19-23.*

By tracking the instrument position and accordingly adapting the view, Shahidi of course improves a surgeon’s view on the lesion and the instrument. But Shahidi does *not* teach correcting the instrument position by a transformation *defined by an optimization method*. In contrast to Shahidi, the claimed invention includes “a transformation that is defined by an optimization method, taking into account [various data including] the geometric description ... of the tubular organ structures.” *See e.g., Claim 1, step (d).*

B. Shahidi does not teach correcting the instrument position by a transformation that takes into account movements of the tubular organ structures themselves

In addition to the optimization method discussed above, the present invention further differs from Shahidi by utilizing a transformation method that takes into account movements of the tubular organ structures themselves. Claim 1 as amended now recites this difference.

In this regard, claim 1 as amended emphasizes the dynamic aspect of the claimed invention, which is particularly important in moving tubular organ structures, such as lungs or kidneys. These organs undergo cyclic movements due to respiration. These movements cause “substantial organ displacement and deformation of the affected regions.” Specification, page 2,

fourth paragraph. The organ displacements then “lead to the spatial movement of the instrument.” Specification, page 3, third paragraph.

By taking into account the organ movement along with the static data and the model of the tubular organ structure, in the claimed invention “the position of the tracked instrument is successively compared with the course of the tubular organ structure and, therefore, the model is adapted and the position of the instrument in relation to the structure is also determined.” Specification, page 3, last paragraph.

Therefore, the claimed invention includes more than “just” tracking an instrument by translating the distance travelled and the orientation of the instrument into a certain perspective view and cutting plane of the volumetric data set, as taught by Shahidi. Rather, the claimed invention employs a successive correction which involves a transformation, taking into account the geometric description, the movement of the tubular structures themselves, and information on the previous distance covered by the instrument.

As a result, the claimed invention improves the registration of the instrument within the organ structure. Particularly, the registration is successively improved by considering more and more positional data of the instrument on its way through the anatomic structure. In this way, the successive transformation can be learned along the distance by considering previous positional data, which improves the accuracy of the instrument/organ recording and thus the navigation through the moving organ structure.

Accordingly, as Shahidi does not teach each and every element of the claimed invention, Applicants respectfully request that the rejection against claims 1-15 and 23-30 be withdrawn.

III. Rejections under 35 U.S.C. § 103(a)

The Examiner maintains the rejection of claim 16 under 35 U.S.C. § 103(a) for allegedly being obvious over Shahidi in view of U.S. Patent No. 5,928,137 ("Green"). Office Action at pages 6. Applicants respectfully traverse this ground for rejection.

As discussed above, Shahidi fails to teach a number of elements in the claimed invention, such as correcting the instrument position by a transformation defined by an optimization method. Green does not cure Shahidi's deficiencies. As a result, Shahidi and Green combined do not teach or suggest each and every element of the claimed invention.

Accordingly, Applicants respectfully request that the rejection against claim 16 be withdrawn.

CONCLUSION

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by the credit card payment instructions in EFS-Web being incorrect or absent, resulting in a rejected or incorrect credit card transaction, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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